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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/501,093 | 07/09/2004 | Steven Dale Westbury | 540-511 | 3055 |

23117 7590 08/23/2006

NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203

EXAMINER

CARPIO, IVAN HERNAN

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2841

DATE MAILED: 08/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/501,093 | Applicant(s) WESTBURY, STEVEN DALE | |
| | Examiner Ivan H. Carpio | Art Unit 2841 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/9/04.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>7/9/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1- 7 rejected under 35 U.S.C. 103(a) as being unpatentable over Ijichi (US Patent 4725920).

With respect to claim 1 Ijichi teaches a flexi-rigid printed circuit board having a rigid area, made up of inner layers of flexible metal (Fig. 2, 24 and 3, 4) and outer layers of rigid insulating material (Fig. 2, 1 and 2), and an integral flexible heat sink area (Fig. 2, 22 and 23) having springy edge (Fig. 2, 28) regions of exposed flexible layers without outer layers of rigid insulating material, and a metal heat conducting body (Fig. 2, element 20) which is springily engaged by the edge regions to provide a heat sink for the rigid areas of the board (inherently). Ijichi does not specifically teach that the flexible layers are made of copper. Flexible copper layers are well known in the PCB art and offer many advantageous properties such as electric and thermal conductivity as well as availability. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose copper for the flexible layers for the purpose of both thermal and electrical energy transfer and because of the abundant availability. Furthermore it has been held to be within the general skill of a worker in the art to select

a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

With respect to claims 2 and 3 and with all the limitations of claim 1, modified Ijichi teaches all of the limitations but does not teach that the exposed flexible copper layers of the springy edge regions are at least partially coated with an anti corrosion material in particular one of tin, lead or gold. Anti corrosion material are well known in the art and are used to protect devices that are exposed to atmospheric conditions (moisture or oxygen) that can cause corrosive damage to devices. Tin particularly is a good anti-corrosive material because of its cost and availability benefits. It would have been obvious to one of ordinary skill in the art at the time of the invention to coat the exposed flexible copper layers with an anti corrosion material, particularly tin, for the purpose of protecting the pcb in corrosive atmospheric conditions with the added benefit of cost and availability.

With respect to claim 4 and with all the limitations of claim 1, Ijichi teaches a tubular metal thermal vias (Fig. 2, 9) inter-connecting flexible copper layers in the rigid area to improve heat transfer between the flexible copper layers.

With respect to claim 5 and with all the limitations of claim 4, Ijichi teaches that at least some of the thermal vias are located in the rigid area below parts where high heat output components are to be mounted (Fig. 2).

With respect to claim 6 and with all the limitations of claim 1, Ijichi teaches the metal heat conducting body is a shell into which the heat sink area is a push fit and held in place by spring contact between the springy edge regions and the shell (Fig. 2).

With respect to claim 7 and with all the limitations of claim 1, Ijichi teaches that the springy edge regions are in the form of tabs extending from the rigid area (Fig. 2).

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 5497495 discloses a pcb with flexible copper layers. US Patents 6274955 and 6317325 both disclose using tin as an anti-corrosive material.

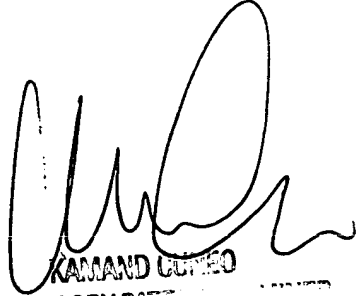
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ivan H. Carpio whose telephone number is 571-272-8396. The examiner can normally be reached on M-R 6:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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